

DRAFT
Engineering Evaluation
Metal Fusion; Plant 5082
Application 12533

BACKGROUND

Metal Fusion has submitted an application for a change in permit conditions to increase their throughput of various metals at S2, Metal Spray Booths. This source was permitted in 1997 in Applications 17390 and 18231. The following background information is excerpted from Application 18231:

"The equipment consists of a plasma flame spray gun that is capable of generating temperatures up to 30,000°F. Powdered material are fed into the gun in measured quantities, melted, and sprayed onto a base to form a high integrity coating."

In addition to plasma spraying, the facility also performs single-wire flame spraying and twin-wire electric arc spraying. These are similar technologies.

The evaluation for Application 18231 states that the source has operated since 1987. A risk screen was triggered for Application 17390. The owner/operator agreed to lower the throughput of nickel to 385 lb/yr to keep the cancer risk below 10 in a million. A risk screen was not triggered for Application 18231 because emissions were lower through the use of a HEPA filter, although a throughput increase to 1000 lb nickel/yr was approved.

The owner/operator has asked for an increase in throughput of nickel powder from 1,000 lb/yr to 2,000 lb/yr.

The owner/operator has also asked for a permit to spray the following materials:

Zinc:	200 lb/yr
Chromium Oxide Power Plasma Spray:	562 lb/yr
Silicon:	500 lb/yr
Yttrium:	60 lb/yr
Aluminum:	600 lb/yr
PP 131 Aluminum Oxide:	600 lb/yr
Suprabronze:	250 lb/yr
Metcoloy #5	100 lb/yr
Metco 444	100 lb/yr
LSM Plasma	10,000 lb/yr

The California Air Resources Board (CARB) has recently promulgated an ATCM entitled "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying." The ATCM has specific emission factors for chrome and nickel that depend on the type of operation and the type of control device. These emission factors will be used in this evaluation and the permit conditions will reflect the ATCM.

EMISSIONS

The California Air Resources Board has evaluated various types of thermal spraying and control devices and has determined emission factors for each combination of spraying technology and control device. Metal Fusion uses plasma spraying, single-wire flame spraying and twin-wire electric arc spraying and a HEPA filter control device. The calculations for nickel and chromium are all based on plasma spraying, which has the highest emission factor of the three technologies.

The emission factor in the ATCM for chromium is $2.86\text{E-}06$ lb CR⁺⁶/lb Cr sprayed. The ATCM states that the chrome sprayed may become hexavalent even if it is not in the hexavalent state before processing. The emission factor for nickel is $1.72\text{E-}05$. These emission factors are used in the calculations.

The calculations for the other metals assume that all of the metal is sent to the filters and that the HEPA filters have an efficiency of 99.9%.

The detailed calculations are attached in Appendix A. Following is a summary of the emissions and the toxic trigger levels from BAAQMD Regulation 2, Rules 1 and 5:

Material	lb/yr	Trigger level Before 6/15/05 (Regulation 2, Rule 1)	Trigger level After 6/15/05 (Regulation 2, Rule 5)
Chromium	0.0011	0.0013	0.0013
Nickel	0.0340	0.7300	0.7300
Zinc	0.2000	6800	1400.0000
Copper	0.2238	460	93.0000
Manganese	2.5718	77	7.7000
Silicon	0.5080		
Yttrium	0.0594		
Aluminum	1.2624		
Iron	0.0750		
Molybdenum	0.0055		
Lanthanum	4.9199		
Strontium	0.7779		
Total	10.6389		

The total emissions are considered to be particulate.

PLANT CUMULATIVE INCREASE

The particulate emissions are insignificant and are less than the 0.007 tons/yr attributed to the source pursuant to Application 17390. Therefore, particulate emissions will not be added to the cumulative increase for this application.

TOXICS

The application is subject to the toxic triggers in BAAQMD Regulation 2, Rule 1, General Requirements, as amended on December 21, 2004, because it was submitted

on April 27, 2005. The emissions do not exceed any trigger in this regulation. The trigger levels in BAAQMD Regulation 2, Rule 5, New Source Review of Toxic Air Contaminants, are shown for reference only. The application does not exceed any trigger in the new regulation.

However, the facility is within 1000 feet of a public school and is therefore subject to Waters Bill notification. A public notice has been prepared in English and Spanish for distribution to the parents of the students and to each address within a radius of 1000 feet of the source.

BACT and TBACT

The source is not subject to BACT because it does not emit more than 10 lb particulate/day. The source is not subject to TBACT because it does not exceed any toxic trigger.

OFFSETS

Offsets are not required because the particulate emissions are less than 1 ton/yr pursuant to BAAQMD Regulation 2-2-303.

ATCM

The facility is subject to the CARB ATCM entitled "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying." The source will emit less than 0.004 lb chromium/yr and less than 2.1 lb nickel/yr. It is an existing source of nickel. However, the proposed use of chromium is new. Therefore, the source is considered to be modified and is subject to the ATCM in accordance with the definition in Section 93102.5(b)(17) and the standard in Section 93102.5(f)(2). Therefore, the relevant requirements from the ATCM will be imposed by permit conditions.

The source must comply with the control efficiency requirements in subsection (c)(2)(A)(2). The requirement is for use of a control device that is certified by the manufacturer to achieve 99.97% control efficiency for particles that are 0.3 micron in diameter. The source must also comply with the enclosure standards in subsection (c)(1)(B) and the ventilation standards in subsection (c)(1)(C).

The source will comply with the 0.1 lb nickel/hr limit because the annual emissions of nickel will be below 0.1 lb.

The owner/operator is subject to requirements to determine the inward face velocity of the enclosure and to perform a visual leak inspection.

The owner/operator is subject to the requirement to use a control device with a control efficiency that is verified by the manufacturer.

The equipment is subject to the following monitoring requirements
Continuous monitoring with differential pressure gauge

Weekly records of pressure drop
Alarms
Visual inspection every 90 days
Replacement of filters in accordance with manufacturer's instructions
Annual measurement of inward face velocity

No source test has been imposed by the ATCM for modified sources below 0.004 lb chromium/yr and below 2.1 lb nickel/yr, probably due to problems with the level of detection.

The owner/operator must keep the following records:

Weekly records of pressure drop
Visual inspection every 90 days
Replacement of filters in accordance with manufacturer's instructions
Annual measurement of inward face velocity

The above requirements will be explicitly stated in the permit conditions.

STATEMENT OF COMPLIANCE

This application is considered to be ministerial under the District's Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 11.7.

This facility is less than 1,000 feet from the nearest school and therefore is subject to the public notification requirements of Regulation 2-1-412.

PSD and NSPS are not triggered.

The equipment will comply easily with the 1.0 Ringelmann opacity limit in BAAQMD Regulation 6, Section 301; the 0.15 grain/dscf limit in Section 310; and the process weight limit in Section 311.

The facility is expected to comply with the CARB ATCM "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying. The permit engineer and the inspector visited the facility and determined that the collection efficiency was acceptable. The spraying operation is totally enclosed. The owner/operator has documentation that the control device is a HEPA filtration system.

PERMIT CONDITIONS

Condition # 14992 -----

Conditions for A/N 18231 Modified, Plant # 5082 S2

~~1. Powder coatings containing nickel shall have a weight percent no greater than 96.0 percent.~~

- ~~— The nickel coating applied to source S-2 Metal Spray~~
- ~~— Booth shall not exceed 1000 pounds in any~~
- ~~— consecutive twelve month period.~~

1a. The owner/operator shall not exceed the following throughputs in any consecutive 12 months on a facility-wide basis:

Nickel:	2,000 lb
Zinc:	200 lb
Chromium Oxide Power Plasma Spray:	562 lb
Suprabronze:	250 lb
Metcoloy #5	100 lb
Metco 444	100 lb
LSM Plasma	10,000 lb

[Basis: Toxics Risk Management, BAAQMD Regulations 2-1-301 and 2-1-412]

1b. Silicon:	500 lb
Yttrium:	60 lb
Aluminum:	600 lb
PP 131 Aluminum Oxide:	600 lb
Total powder coatings:	14,972 lb

[Basis: BAAQMD Regulation 2-1-301]

1c. The owner/operator may use other coatings as long as usage of the following compounds or materials do not exceed the levels below and no new toxic air contaminant, as defined in BAAQMD Regulation 2, Rule 5, is used:

<u>Material</u>	<u>lb/12 consecutive months</u>
<u>Chromium</u>	<u>392</u>
<u>Nickel</u>	<u>1977</u>
<u>Zinc</u>	<u>200</u>
<u>Copper</u>	<u>224</u>
<u>Manganese</u>	<u>2572</u>

[BAAQMD Regulations 2-1-301, 2-1-412, Toxics Risk Management]

2. Emissions from S2 Metal Spray Booth shall be controlled by A3 Dust Collector Sulzer Metcom SME 27- 7000, 7000 cfm. All coating operations shall cease when A-3 is not operating. [Basis: Toxics Risk Management]

3a. The capture efficiency of A-3 shall be at a minimum 99.99% by weight. [Basis: Toxics Risk Management, Cumulative Increase]

3b. The control efficiency of A3 shall be at least 99.97% @ 5 microns. [CARB ATCM "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying]

4. ~~Coatings other than the material specified in~~
~~condition #1 may be used, provided that the following~~
~~condition is met:~~

- ~~a. The use of these materials do not increase toxic emissions above any risk screening trigger level.~~Deleted Application 12533.
5. In order to verify compliance with ~~condition part Nos. 1 and 2~~, the owner/operator shall keep the following records in a District approved log. These records shall be kept on site and made available for District inspection upon request for a period of 24 months from the date on which a record is made:
- a. Type and monthly usage of all ~~nickel~~ coatings used;
 - ~~b. If a material other than that specified in condition #1 is used, all other powder coatings used that are listed in Table 2-1-316 (Toxic Air Contaminant Trigger Levels) shall be reported. And the monthly usage shall also be reported.~~
6. By January 1, 2006, the enclosure must meet the following criteria:
- a. The enclosure must be exhaust ventilated such that a continuous inward flow of air is maintained from all designed make-up air openings during thermal spraying operation.
 - b. The average inward face velocity of air through the enclosure must either be a minimum of 100 feet per minute or the minimum velocity for metal spraying facilities as established in "Industrial Ventilation, A Manual of Recommended Practice", 25th Edition. The inward face velocity must be confirmed by a pitot tube or other anemometer. The inward face velocity must be measured at least once per calendar year and whenever the control system is changed in any way that may have an impact on air flow to ensure that the ventilation system is working properly. The owner/operator shall use the method in Appendix 2 of the CARB ATCM entitled "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying."
 - c. When thermal spraying is being performed, all air inlets and access openings must be covered to prevent the escape of dust or mist contaminants into areas outside the enclosure. This requirement does not apply to any designed or intended make-up air vents or openings.
 - d. Before the enclosure is opened, thermal spraying must cease and the exhaust system must be run for a sufficient period of time to remove contaminated air within the enclosure. A minimum of three air exchanges must be exhausted from the booth after thermal spraying ceases.
- [Basis: CARB ATCM "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying"]
7. By January 1, 2006, the ventilation system must meet the following criteria:
- a. The ventilation system and control device must be properly maintained and kept in good operating condition at all times. Any leak, as determined by a visual leak inspection conducted in accordance with Appendix 3 of the CARB ATCM entitled "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying" is a violation of this condition. The owner/operator shall conduct visual inspections at least once

- every 90 days to ensure that no leaks are present in the control device or ventilation system.
- b. Material collected by the control system must be discharged into closed containers or an enclosed system that is completely sealed to prevent dust emissions.
- c. The dust collector for the control device must be maintained in a manner that prevents emissions of particulate matter into the ambient air.
[Basis: CARB ATCM "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying"]
8. By March 1, 2006, the owner shall conduct the following tests in accordance with the CARB ATCM "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying:
- a. A measurement of inward face velocity in accordance with Appendix 2 of the ATCM
- b. A visual leak inspection in accordance with Appendix 3 of the ATCM
[Basis: CARB ATCM "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying"]
9. Before commencing operation with any material containing chromium, the owner/operator shall verify that negative pressure is maintained while the enclosure door is open, using one of the procedures in subsection (d)(1)(C) of the ATCM.
[Basis: CARB ATCM "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying"]
10. The owner/operator shall ensure that a pressure differential gauge continuously monitors pressure drop across the control device while conducting thermal spraying. The gauge must have a high and low setting for the pressure drop and must trigger an alarm system when the high or low set points are exceeded. The gauge must be designed to accurately measure pressure drops within the expected range and have an accuracy of at least +/- 5% of full scale. The gauge must be located so that it can be easily visible and in clear sight of the operation of maintenance personnel. The pressure drop must be maintained per manufacturer's specifications. If the pressure drop is outside of the acceptable limits, the owner/operator must shut down the thermal spraying operation immediately and take corrective action. The thermal spraying operation must not be resumed until the pressure drop is within the specified limits.
[Basis: CARB ATCM "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying"]
11. The owner/operator shall record the pressure drop once per calendar week while conducting thermal spraying. If no thermal spraying occurs in any calendar week, the pressure drop record will not be required for that week.
[Basis: CARB ATCM "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying"]
12. The owner/operator shall keep the following records. The records shall be retained for at least 5 years from the date of entry.
- a. Weekly records of pressure drop

- b. Visual inspections. The record must identify:
1. The date and time of the inspection,
 2. The name of the device inspected,
 3. A brief description of the working condition of the device during the inspection,
 4. All maintenance activities performed on the components of the air pollution control system,
 5. The actions taken to correct deficiencies, and
 6. The person that conducted the inspection.
- c. Replacement of filters in accordance with manufacturer's instructions
- d. Annual measurement of inward face velocity
- e. Each month, the name and quantity of material containing chromium and nickel used, and the total usage to date for that calendar year
- f. Records of any occurrence, duration, cause (if known), and action taken for each equipment malfunction and/or failure. This recordkeeping requirement applies only to equipment malfunctions or failures that cause or may cause uncontrolled emissions to be released.
- [Basis: CARB ATCM "Airborne Toxic Control Measure to Reduce Emissions of Hexavalent Chromium and Nickel from Thermal Spraying]

RECOMMENDATION

Issue change of conditions to:

S2 2 Metal Spray Booths using plasma spraying, single-wire flame spraying and twin-wire electric arc spraying, abated by A3, Cartridge Type HEPA Dust Collector, Metal Spray

By: _____
Brenda Cabral
Senior Air Quality Engineer

Date: _____

Appendix A Emission Calculations

Chromium and Nickel

Material			Emission Factor	Abated emissions	Trigger level
Chromium					
lb	% Cr	lb emitted			
Chromium Oxide Power Plasma Spray					
562		65	365.3		
Metcoloy					
100		18	18		
Metco 444					
100		9	9		
Total Chrome		392.3	2.86E-06	0.0011	0.0013
Nickel					
lb	% Ni	lb emitted			
Nickel Arc Wire					
2000		95	1900		
Metcoloy					
100		5	5		
Metco 444					
100		72	72		
Total Nickel		1977	1.72E-05	0.0340	0.73

Emission Calculations

All Other Compounds

Material			Abated emissions	Trigger level
Zinc				
lb	% Zn	lb emitted		
Zinc Flame Spray				
200	100	200	0.2000	1400
Copper				
lb	% Cu	lb emitted		
Suprabronze				
250	89.5	223.75	0.2238	93
Manganese				
lb	% Mn	lb emitted		
Metcoloy				
100	8.5	8.5		
LSM				
lb	%	lb MnO	MW Mn	MW O
10000	33.1	3310	54.93	16
				MW MnO
				70.93
				lb Mn
				2563.348
Total Manganese			2571.848	7.7
Other				
Silicon				
lb	% Si	lb emitted		
500	99	495		
Aluminum Arc Wire				
600	2	12		
Metcoloy				
100	1	1		
		508	0.5080	
Yttrium				
lb	% Y	lb emitted		
60	99	59.4	0.0594	

Material							Abated emissions	Trigger level
Aluminum								
lb	% Al		lb emitted					
Nickel Arc Wire								
825		5	41.25					
Aluminum Arc Wire								
600		99	594					
PP-131								
600		99.4	596.4					
Suprabronze								
250		9.5	23.75					
Metcoloy								
100		7	7					
Total aluminum			1262.4				1.2624	
Iron								
lb	% Fe		lb emitted					
Metcoloy								
100		67.5	67.5					
Suprabronze								
250		1	2.5					
Metco 444								
100		5	5					
Total iron			75				0.0750	
Molybdenum								
lb	% Mb		lb Mb					
Metcoloy								
100		5.5	5.5				0.0055	
Lanthanum oxide								
LSM								
lb	%	% La2O3	MW La	MW O	MW La2O3	lb La		
10000		57.7	5770	138.906	16	325.812	4919.939	4.9199
Strontium								
LSM								
lb	%	lb SrO	MW Sr	MW O	MW SrO	lb Sr		
10000		9.2	920	87.62	16	103.62	777.9425	0.7779

